

Applicati n No.: 09/817,682

Atty Docket No.: JCLA5662-CIP

REMARKS**Present Status of the Application**

The Examiner is thanked for his thorough examination of the present application. The Office Action rejected claims 1-3 under 35 U.S.C. § 102(e), as being anticipated by Kepler et al. (US Patent No. 6,037,671). Claims 1-3 were rejected under 35 U.S.C. § 103(a) over Shiraishi (US Patent 6,285,455). Claims 1-3 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification. Drawings were objected for not showing every feature specified in the claims.

Claim 1 has been amended and the specification has been amended. This Amendment is promptly filed to place the above-captioned case in condition for allowance. Claims 1-3 are pending in the application. For at least the following reasons it is submitted that all claims 1-3 are in condition for allowance. Reconsideration and withdrawal of the Examiner's rejections is respectfully requested.

Summary of the present invention

The present invention provides an alignment mark configuration, wherein damage to the alignment mark due to chemical mechanical polishing is prevented. The alignment mark on the substrate comprises a plurality of recesses. The width of each recess is about 2 microns to about 6 microns and the width of the flat spacing "d" between the recesses is about 6 microns to 12 microns. If any type of trench, for example, shallow trench isolation, is also being formed on the substrate, the spacing "D" between the trench and the alignment mark is about five times to eighty

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times of the spacing “d” between the recesses.

As a result, when the substrate is pressed against the flexible polishing pad on the polishing table, the polishing pad can maintain flatness in the neighborhood of the alignment mark. A sharp diffraction pattern of the alignment mark thereby results to allow the overlay detector to receive a clear alignment mark signal and to increase alignment accuracy.

Rejections under 35 U.S.C. §112 and Drawing objections

Claims 1-3 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification. The Office Action considers the limitation “plurality of layers” as not being mentioned in the specification. Similarly, drawings were objected for not showing “the plurality of layers” specified in the claims.

Applicants respectfully submit that the specification has been properly amended to include the statement of “a plurality of layers”. The supporting ground is found in claim 1. Withdrawal of this 112 rejection is respectfully requested.

As for the drawings, Applicants respectfully assert that the drawings properly show every feature specified in the claims. As stated in the amended specification, substrate 100 comprises a plurality of layers and figure 1 is a schematic, top view illustrating the alignment mark configuration. If the plurality of layers of the substrate 100 are disposed overlying the alignment mark and are substantially transparent to the light, it is reasonable not to see (or show) the plurality of layers from the top view. Moreover, if the plurality of layers is to be formed subsequently over the alignment mark, it is also rational not to show the plurality of layers in the top view of figure 1.

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However, if it is considered as necessary by the Office Action, Applicants are glad to submit a cross-sectional view of the alignment mark upon the request of the Office Action.

Reconsideration and withdrawal of this objection is respectfully requested.

Rejections under 35 U.S.C. §102 & 103

Claims 1-3 stand rejected under 35 U.S.C. §102(e) as being anticipated by Kepler et al. (US Patent No. 6,037,671).

The Office Action asserted that Kepler et al. substantially discloses the structure of this invention. The Office Action considers Kepler's leftmost section 23 and the middle section 23 (Fig. 4) equivalent to the plurality of recesses and the trench of this invention.

Applicants respectfully traverse this rejection and submit that the cited reference cannot achieve the present invention. The claimed features of the invention recited in amended claim 1 as follows:

1. An alignment mark configuration, which is applicable on a substrate comprising a plurality of layers, the alignment mark configuration comprising:
an alignment mark on the substrate, wherein the alignment mark comprises a plurality of recesses and a spacing between the neighboring recesses is "d", *wherein the recess has a width of about 2 microns to 6 microns and the spacing "d" is in a range of about 6 microns to about 12 microns; and*
a trench, wherein a spacing between the trench and the alignment mark is of a range between about 5d to about 80d.

The present invention provides an alignment mark configuration, the alignment mark on the substrate comprises a plurality of recesses. As set forth in amended claim 1, the recess has a width of about 2 microns to about 6 microns and a width of the flat spacing "d" between the recesses is about 6 microns to 12 microns. Kepler, however, does not teach nor suggest that the

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recess has a width of about 2 microns to about 6 microns and the spacing "d" is in a range of about 6 microns to about 12 microns. As any type of trench, for example, shallow trench isolation, is also being formed on the substrate, the spacing "D" between the trench and the alignment mark is about five times to eighty times of the spacing "d" between the recesses. Therefore, the upper sidewall of the recesses is prevented from being damaged during the step of global planarization by means of chemical mechanical polishing. The scattering of the incident light due to the damage induced to the upper sidewall of the recesses is thereby prevented. As a result, the alignment mark can provide a clear alignment signal to the overlay detector to increase the alignment accuracy.

In contrast, Kepler discloses the first trenches 23a spaced apart by the first uprights 23b (in the leftmost section 23 in Figure 4) have the same width w_1 of about 0.375 micron. The section 23 and the section 22 both have a width W of about 8 microns.

Kepler fails to disclose or suggest "the recess has a width of about 2 microns to about 6 microns and the spacing "d" is in a range of about 6 microns to about 12 microns". Therefore, the scope of the amended independent claim 1 is not covered by Kepler's invention.

For at least these reasons, Applicants submit that Kepler does not anticipate the present invention as recited in amended independent claim 1 and claims 2-3 depending thereon and respectfully request that the rejection of claims 1-3 under 35 U.S.C. §102(e) be withdrawn.

Claims 1-3 were rejected under 35 U.S.C. § 103(a) over Shiraishi (US Patent 6,285,455).

Shiraishi merely discloses forming recesses 23a-23c in the circuit pattern area and narrower recesses 23d at the pitch P in the alignment mark area (Fig. 5c). The circuit pattern 29 is then formed in the form of insulators 25a-25c embedded in the wider recesses in the circuit pattern area,

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while the alignment mark 26 is formed in the insulator 25d embedded in the recesses formed at the pitch P in the alignment mark area.

As noted by the Office Action, Shiraishi fails to expressly disclose the distance between the alignment trenches and the trench is in the range of 5P to 80P (5d to 80d). The Office Action considers that the lines in Shiraishi's Fig. 5g make it clear that the distance is around 9P.

Applicants respectfully submit that the diagrams of Shiraishi are simply schematic and not drawn according to scale. Therefore, the assertion that Shiraishi anticipates the present invention based on the not-to-scaled drawings is unsubstantiated. Furthermore, Shiraishi fails to teach or suggest each and every feature of this invention, especially the feature of "the recess has a width of about 2 microns to about 6 microns and the spacing "d" is in a range of about 6 microns to about 12 microns" in amended claim 1.

The Office Action further alleges that this distance is regarded as a matter of obvious design choice.

Applicants respectfully disagree with this allegation. As discussed above, when D is of the range between about 5d to 80d, the upper sidewall of the recesses of the alignment mark is prevented from being damaged during the global planarization (e.g. chemical mechanical polishing), which is of great importance. As a result, the diffraction pattern of the alignment mark is sharper and provides a clear alignment signal to the overlay detector, thus greatly increasing the alignment accuracy.

Hence, it is unreasonable for the Office Action to assert the distance as simply design choices, under the circumstances that the references neither disclose this limitation of "a spacing

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between the trench and the alignment mark is of a range between about 5d to 80d" nor recognize its significance.

As a result, Applicant submits that amended independent claim 1 patently define over the cited references. Dependent claims 2 and 3, which depend on allowable claim 1, are also allowed for the same reasons that claim 1 is allowed. For at least the foregoing reasons, all pending claims patently define over the cited references, either alone or in combination and should be allowed. Accordingly, the rejection under 35 U.S.C. §103(a) should be withdrawn.

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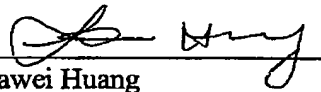
CONCULSION

For at least the above reasons the claims are believed to be in a condition for allowance and such allowance is respectfully requested. If the examiner disagrees and rejects any claim, then the Examiner is encouraged to contact the undersigned to arrange for a phone interview to better understand, and resolve, any disagreement.

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